

**THE FUTURE FOR
TOTAL ELECTRIC
VEHICLES . . .**



**NICKEL-IRON
POWER**

Eagle-Picher technology . . . the so



NOW! There is a reliable, Nickel-Iron battery that weighs less and stores more energy than a conventional lead-acid battery.

Long-life, deep-cycle Nickel-Iron technology can extend the range of any electric vehicle!



olution to your battery needs.

A technology that will power both present and future total electric vehicles is being brought to production by Eagle-Picher. Design innovation has substantially improved the performance of the historically rugged and reliable electrochemical couple. Now, there is a Nickel-Iron battery with greater specific energy and power.

Designated the NIF-200-5 module, it is the most recent addition to the family of Nickel-Iron batteries developed by Eagle-Picher. This configuration is compatible with BCI Group GC-2 applications.

It weighs up to 20% less, stores up to 50% more energy and can last up to four times longer than conventional lead-acid batteries. And it has a deeper cycle capability to assure problem free operation in the field.

Routine water addition has been made simple with an especially designed, single-point, watering

system. It makes routine battery maintenance fast and error free.

The Nickel-Iron battery can be charged with your current lead-acid battery charger with only minor modifications. Or you may be interested in the quick charging capabilities available with a new charger manufactured especially for Nickel-Iron batteries.

If your present electric vehicles spend too much time plugged into electrical outlets, run out of energy before the work shift ends, or require battery replacements too often . . . consider the future, today.

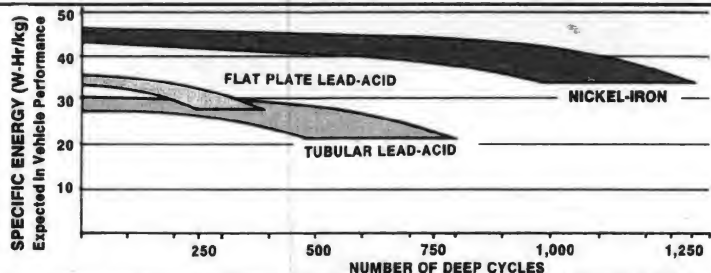
Give us a phone call. We will be glad to discuss the benefits of an Eagle-Picher Nickel-Iron battery made to meet your specific application.

Your call will be answered by a technical engineer, not a salesman. Together, we can determine how this innovative power plant might serve you.

Phone 417-623-8000 or 417-623-8333

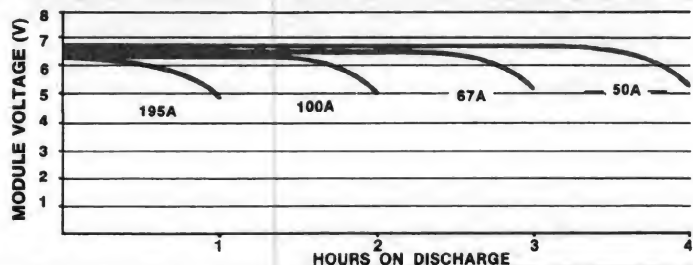
SPECIFIC ENERGY VS CYCLE LIFE of typical BCI Group GC-2 battery types

In comparable applications, you may receive from 50% to 100% improvement in your electric vehicle's range when replacing lead-acid batteries with a set of Eagle-Picher Nickel-Iron batteries.

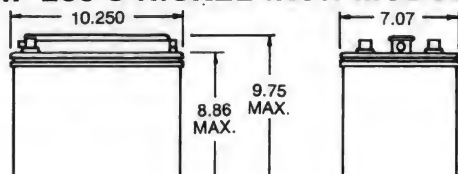


CONSTANT RATE DISCHARGE VOLTAGE and CAPACITY

Rate (A)	Cut-Off (V)	Capacity (A-Hr)
200	4.2	195
100	4.5	199
67	5.0	204
40	5.0	209



NIF-200-5 NICKEL IRON MODULE



PEK

Nickel-Iron...a vehicle battery that meets all major demands...High Energy, High Power, Deep Cycles and Long, LONG Life



Developed by Eagle-Picher, the company that's at home in the future and founder of many advancements for electric vehicles.

- Designed and built batteries for the Lunar Rover.
- Designed and built the batteries for Skylab and many deep space probes for NASA.
- Designed and built batteries for electric vehicles that captured 21 land speed records.
- Designed and built batteries for the electric vehicle that held the land distance record for six years.
- Designed and built batteries for speed boats that have held many speed and distance records.

EAGLE **EP** PICHER

SINCE 1843

COUPLES DEPARTMENT

P.O. Box 47

Joplin, MO 64802

Phone 417-623-8000 or 417-623-8333 • Fax 417-623-5000

Ext. 201

Jim Wilfred

TECHNICAL DATA SHEET

Battery No. NIF-200-5

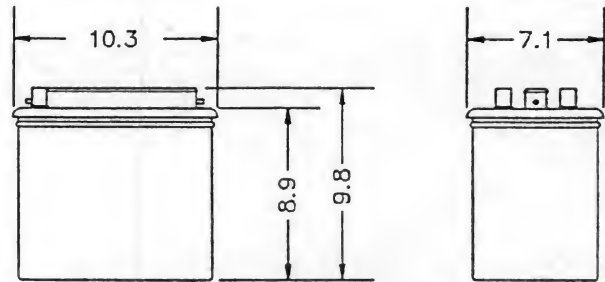
Nickel-Iron Module

Electrochemistry:

- Nickel/KOH/Iron

Physical Data:

- Length10.3 max. in.
- Width7.1 max. in.
- Height9.8 max. in.
- Volume660 in³
- WeightDry 42 lbs.
-Activated 54 lbs.



Outline Configuration

Electrical Information

Nominal Discharge Voltage(C/2):..... 6.0 Volts

Voltage Limits:

- End of Discharge (C/3)..... 5.0 Volts
- End of Discharge (C/2)..... 4.5 Volts
- End of Charge (C/5) 8.6 Volts
- End of Charge (C/10)..... 8.3 Volts

Open Circuit Voltage:

- 0% S.O.C. (1 Hr. after discharge)..... 6.1 Volts
- 100% S.O.C. (1 Hr. after charge)..... 7.2 Volts

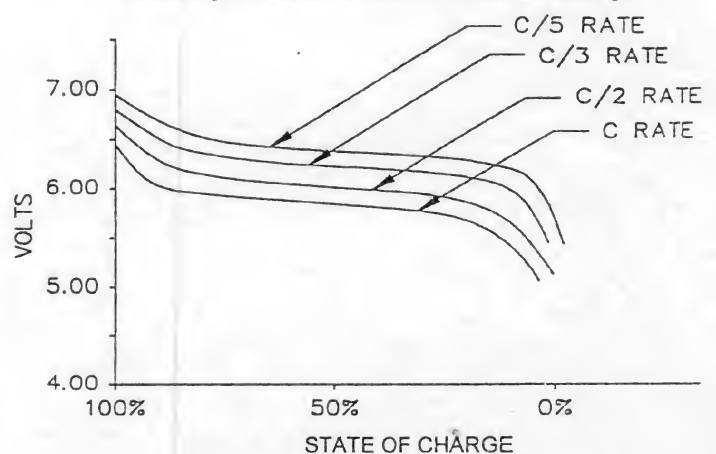
Discharge Capacity:

- C/2 199 Ah to 4.5 Volts
- C/3 204 Ah to 5.0 Volts

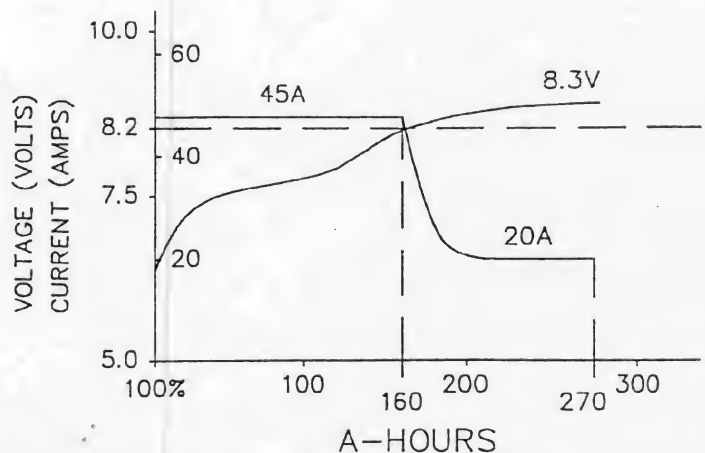
Percentage Overcharge Recommended:

- 35-40%

Discharge Curves- Volts vs. State of Charge



Recommended Charge Profile (from 0% S.O.C. @ 25°C)



Thermal Characteristics:

- Operating temperature..... 0-60°C
- Temperature compensated charge voltage required (8.3 V at 25°C nominal)

Unique Operating Characteristic:

- Hardware has been designed for single point watering and gas management
- Chargers have been developed for 24V, 36V and 48V battery configurations

Case Material:

- Polypropylene plastic, heat sealed cover to case

EAGLE-PICHER INDUSTRIES, INC.

COUPLES DEPARTMENT • ADVANCED SYSTEMS OPERATION

RANGELINE FACILITY

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SEP 15, 1993